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ABSTRACT

The McCarron-Dial System is useful for both vocational and clinical evaluation of neuropsychologically disabled adults. Five factors (verbal-cognitive, sensory, motor, emotional, and integration coping) are used to predict vocational competency, which is measured by work samples and behavior scales, during the first twelve months of a client's vocational program. Wage earnings can also be predicted from level of competency. In the clinical evaluation, the instrumentation remains essentially the same, but a medical examination/history and formal neuropsychological testing are added since, the focus differs considerably. The focus is threefold: (1) diagnosis of organic brain syndrome and locus of a specific lesion; (2) determination of whether the condition is chronic or acute, and static or progressive; and (3) evaluation of the effects of brain dysfunctions on learning and adaptive behavior. A profile and detailed case history is used to illustrate the comprehensive (five-day) version of the evaluation in both a clinical and a vocational setting. A product of a comprehensive research program which began in 1970, the McCarron-Dial System has been used--for rehabilitation counseling, work evaluation, clinical diagnosis, and program evaluation--with adults disabled by mental retardation, cerebral palsy, emotional disorders, drug or alcohol abuse, impaired vision or hearing, and brain tumors. (CP)

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A REVIEW OF THE McCARRON-DIAL EVALUATION SYSTEM

# THE McCARRON-DIAL SYSTEM--AN APPROACH TO CLINICAL, VOCATIONAL, AND EDUCATIONAL EVALUATION

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ABSTRACT

THE McCARRON-DIAL SYSTEM--AN APPROACH TO CLINICAL, VOCATIONAL, AND EDUCATIONAL EVALUATION

The McCarron-Dial System is a neuropsychological approach used in clinical, vocational, and educational evaluation. The system is designed to describe the individual's abilities and limitations in cognitive, emotional-coping, and sensorimotor function; provide predictive information regarding work potential; suggest appropriate strategies for rehabilitation; and provide information useful in predicting the individual's response potential to an education and rehabilitation program. The system (or specific assessment components) has been effectively used in the evaluation of many disabilities which have etiologies related to structural or functional deficits in the central nervous system.

## McCARRON-DIAL EVALUATION SYSTEM

The McCarron-Dial Evaluation System is a neuropsychological approach used in vocation, clinical, and educational evaluation. The system is designed to describe the individual's abilities and limitations in cognitive, emotional-coping, and sensorimotor functioning; describe learning deficits; provide predictive information regarding work potential; suggest appropriate strategies for education and rehabilitation; and provide information useful in predicting the individual's response potential to a rehabilitation program. The system (or specific assessment components) has been effectively used in the evaluation of the following disability groups: 1) mental retardation; 2) cerebral palsy; 3) emotional or psychiatric disorders; 4) stroke and head trauma; 5) central nervous system disease, including brain tumor; 6) conditions resulting from alcohol and drug abuse; 7) the visually impaired (modified version of the system); and 8) the hearing-impaired/deaf (in conjunction with other instrumentation). Since the McCarron-Dial System is used for a variety of evaluation purposes, it is important to delineate these major uses when describing the system's application.

### - Vocational Evaluation -

A brief review of the McCarron-Dial Work Evaluation System (MDWES) indicates that the system is designed to assess brain-behavior function on each of five factors previously found to be related to vocational competency. Vocational competency in this context is defined as the expected rate of productivity on the Fishing Tackle Assembly (FTA) work sample and the expected percentile rating on the San Francisco Vocational Competency Scale (SFVCS) as measured during the first twelve months of a client's vocational program. The FTA work sample provides a representative measure of actual work output while the SFVCS provides a standardized measure of behavior in the work environment.

The five MDWES factors and specific instruments used to predict vocational competency are:

1. Verbal-Cognitive Ability - measured by the Wechsler Adult Intelligence Scales (Wechsler, 1955) or the Stanford Binet Scales (Terman and Merrill, 1970), and the Peabody Picture Vocabulary Test (Dunn, 1965).

2. Sensory Skills - measured by the Bender Visual Motor Gestalt Test (Bender, 1938) and the Haptic Visual Discrimination Test (McCarron and Dial, 1975a).

3. Motor Skills - measured by the McCarron Assessment of Neuromuscular Development, 1975b).

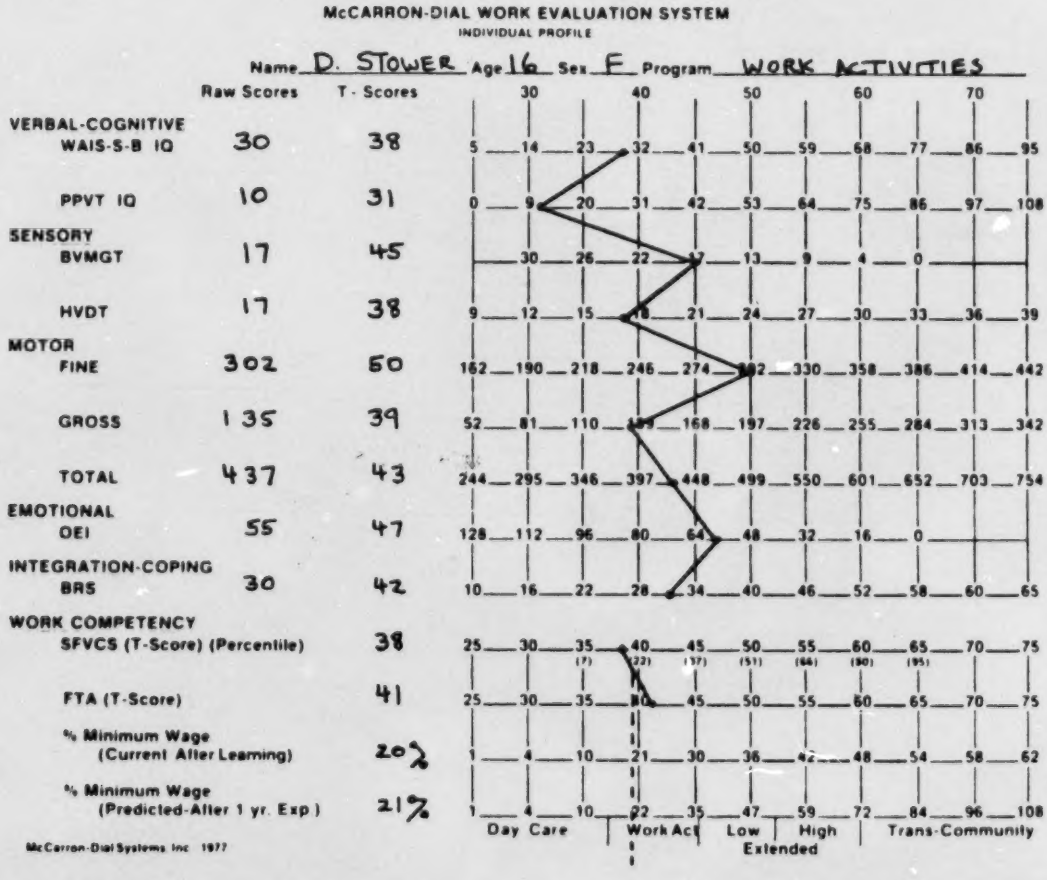
4. Emotional Adjustment - measured by the Observational Emotional Inventory, (McCarron and Dial, 1975d).

5. Integration Coping - measured by the Dial Behavior Rating Scale (Dial, 1973).

## Vocational Competency

The individual's level of vocational competency is predicted from mathematical regression equations. A structured guideline is provided by the system for interpretation of the predicted vocational competency level. The determination of the client's level of vocational competency is an important step in accurately and objectively describing the significance of verbal, sensorimotor, and emotional-coping behavior as it may pertain to the individual's rehabilitation. The descriptive factor data and predicted levels of performance and productivity are illustrated in the following client profile:

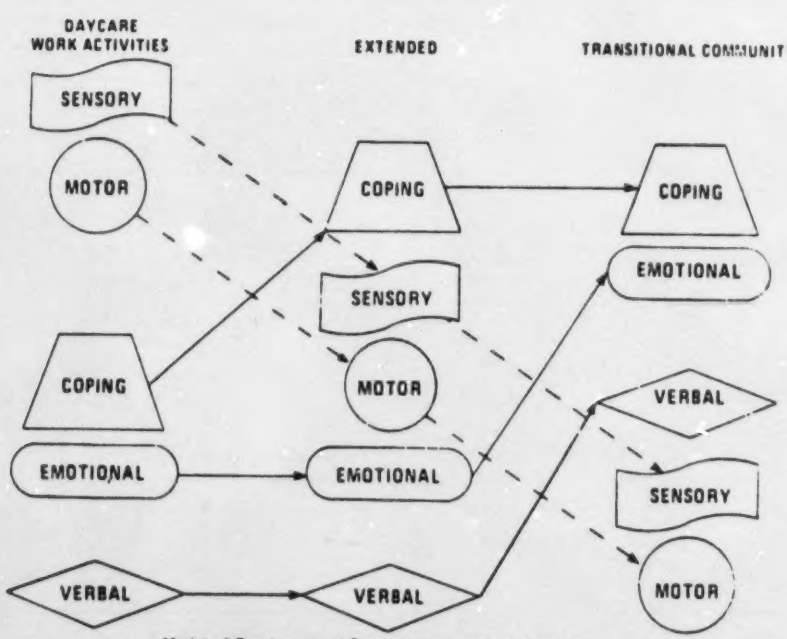
FIGURE I



The client's level of vocational competency is defined by the McCarron-Dial System as an equal balance between expected work output and observed interpersonal or social behavior while on the job. This is an important concept in the system: an individual's effectiveness in the world of work (and therefore the individual rehabilitation plan) must equally consider both interpersonal or social skills and work productivity.

The individual's level of vocational competency also indicates the relative significance of a given MDWES factor. The five factors measured by the system are differentially interpreted for an individual depending on his "predicted level of vocational competency." The levels of vocational competency are synonomous with the programming ranges: 1) daycare, 2) work activities, 3) extended sheltered, 4) traditional training, and 5) community employment level. The program ranges are delineated at the bottom of the Individual Profile (see Figure 1). The factor interpretations are guided by the theoretical model entitled: "Developmental Prerequisites to Vocational Competency." The developmental prerequisites model is similar in some respects to developmental learning theory described by Piaget, 1952 and 1954. In effect, the developmental prerequisites theory suggests that at each level of vocational competency (work activities through community levels) specific predictor/descriptive factors emerge as relatively greater in interpretive and programming significance than other factors. In fact, the five factors measured by the MDWES are arranged in specific hierarchies at each level of vocational competency. Figure II, for example, illustrates the relative significance of the five factors for three different levels of vocational competency.

FIGURE II




Model of Developmental Prerequisites for Work Competency

At the Work Activities level, the most significant factor for interpretation and rehabilitation planning is the sensorimotor factor; second in importance is the emotional-coping factor; and finally the verbal-cognitive factor emerges as significant. For the client predicted to function in the Work Activities range, two points of interpretation are presented: 1) identified sensorimotor deficits should be either remediated or accommodated as a program priority; and 2) the sensorimotor factor measures will most accurately describe the specific disabilities of the client. Further, the theory suggests that higher levels of vocational competency are not probable for the work activity client unless the specific deficits in function are systematically addressed in order of relative significance. At each progressively higher level of vocational competency. the predictor/descriptive factors shift in order of relative significance. The Developmental Prerequisites Theory helps to organize an otherwise complex phenomenon that has been observed to occur in evaluation of clients at varying levels of vocational competency.

The McCarron-Dial Work Evaluation System may also be used to predict current and future optimum wage earnings in specific situations. The present wage prediction is derived from the level of vocational competency. The wage is expressed in "percent of minimum wage" and is presented on the lower portion of the individual profile. The wage calculation is an estimate of the individual's initial earning capacity following acquisition of a particular task. The estimate presumes an optimum work environment devoid of performance barriers.

The "predicted earnings ability" is also presented in the lower portion of the individual profile sheet. The predicted earning ability is the expected rate to be achieved after one year of work experience in the Rehabilitation Workshop. This estimate may serve as a goal for rehabilitation program staff, but is not a ceiling on the individual's potential level, (Dial and Swearingen, 1976).

The Evaluation Procedure

In addition to predicting vocational competency and anticipated wage earnings, the assessment of clients performance on the five predictor factors provides descriptive information concerning the client's disabilities and gives the evaluator a holistic view of significant behavior related to work and personal-social adjustment. The MDWES administration format provides for two different methods of evaluation. In the "abbreviated version," the evaluator administers the appropriate instruments to assess just the verbal-cognitive, sensory, and motor factors. This procedure requires approximately two hours to complete and predicts the criteria of vocational competency by the use of regression equations. While significant information is provided by the abbreviated version, some predictive validity to vocational competency is lost (R = .79 to the SFVCS; and .70 to the FTA work sample). Several concurrent validation studies have resulted in similar findings, (Packard, Henke, and McCollum, 1975).

Predictive cross validation of the abbreviated MDWES battery has been demonstrated in a study by Dial, McCarron, Swearingen and Freeman, 1977. Dial, et.al. compared the predicted program placement level (using the MDWES regression equations) of 57 neuropsychologically disabled adults to a follow-up evaluation of the client's actual level conducted 12-18 months after the

predictions were made. The results revealed a contingency coefficient between the predicted and actual placement status equal to .89, significant at the $p = < .001$ level.

The full comprehensive version of the MDWES, on the otherhand, requires a two-hour per day observation period in a work environment (generally sheltered) for a total of five days. The emotional and integration-coping factors are evaluated during this period. Several evaluees may be observed by the evaluator simultaneously during this period. The predictive validity with the SFVCS and FTA under this method is R =.90 and .75 respectively. The comprehensive version also provides at least three distinct strands of descriptive data, namely, 1) program placement information, 2) interpretation of profile configuration, and 3) factor interpretation.

Profile Interpretation

Profile interpretation is guided by representative disability samples provided in the manual (McCarron and Dial, 1975c). The disability samples include composite clinical profiles for "organic mental retardate", "environmental disadvantaged," "emotional disturbed," "cerebral palsy," "recovering alcoholic," and "non-disabled." Interpretation procedures are described by the manual in detail, including suggested interpretation for each profile configuration and for significant disparity encountered between or among the various factor scores by a given individual.

The following case study of Anthony Mitchum illustrates a comprehensive McCarron-Dial vocational evaluation:

McCarron-Dial Work Evaluation Report

| | | | |
|---|---|---|---|
| Name: | Anthony Mitchum* | Sex: | Male |
| Period of Evaluation: | 05-22-72 through 05-26-72 | Case Number: | 000555 |
| Date of Birth: | 07-27-46 | | |
| Chronological Age: | 09-22-25 | | |
| Place of Examination: | Beaumont State Center for Human Development | | |
| Examiners: | L. T. McCarron and Jack G. Dial | | |

| Factors Assesses | Tests Administered | T-Scores | Factor T |
|---|---|---|---|
| Verbal-Cognitive | Wechsler Adult Intelligence Scale (WAIS) | 48 | |
| | Peabody Picture Vocabulary Test (PPVT) | 52 | 50 |
| Sensory | Bender Visual Motor Gestalt Test (BVMGT) | 55 | |
| | Haptic Visual Discrimination Test (VHDT) | 52 | 54 |
| Motor | McCarron Assessment of Neuromuscular Development (MAND) | 57 | 57 |
| Emotional | Observational Emotional Inventory (OEI) | 45 | 45 |
| Integration-Coping | Behavioral Rating Scale (BRS) | 47 | 47 |

* Name is fictitious.

Reason for Referral

Anthony Mitchum, a twenty-six year old male, was reviewed by the staff of the Regional Evaluation Workshop and Rehabilitation Agency for the purpose of providing an assessment of training and work potentials in an actual work situation. The staff was particularly interested in obtaining information concerning Anthony's potential for independent community life, abilities related to job performance, and performance on standardized work samples. The assessment focused on sensory motor abilities associated with various task and job families (such as maintenance, assemblage, etc.), work capacity, persistence, speed, and behavioral dynamics. Neuropsychological and perceptual motor tests, as well as work performance evaluations, were used to estimate Anthony's characteristic work performance.

Background Information

Anthony is from a lower socioeconomic environment, and resides with his mother and sister in Beaumont, Texas. The father is deceased. Anthony attended a local elementary school but special education provisions were not available during the time of his attendance. He attended Austin State School (Austin, Texas) from 1966 to 1968. In 1968 he entered a "prevocational" program at the Beaumont State Center for Human Development, Texas Department of Mental Health and Mental Retardation. No vocational history is recorded, nor are there any apparent medical restrictions to employment beyond the primary diagnosis of mental deficiency.

Behavioral Observations

Anthony was cooperative during the entire evaluation procedure, and he did not manifest observable signs of anxiety. He appeared quite confident in his performance and stated that he was doing "above average work." His general approach to performing the assessment tasks was rather hurried and enthusiastic. He was able to follow specific concrete directions and completed all tasks. Relaxed conversation was maintained throughout the two hour evaluation session. Anthony's right side of his body appeared to be weaker than his left side and he would favor the weak side by resting his standing weight on the left leg. Anthony's left eye appeared dominant; he tilted his head at an angle to view the test materials.

Results

Verbal-Cognitive Factor (WAIS and PPVT)

Anthony's median verbal-cognitive T-score of 50 is within the lower extended range of sheltered employment. Communication with Anthony will require clear, concrete, and as specific directions as possible. He can be expected to follow a more complex sequence of instructions, if the communication sequence is presented in small units with repetition. He is capable of communicating effectively when describing situations and events only within his immediate environment. He can understand and assimilate instructions involving several tasks within one job, and can transfer some previously learned skills from one job to another. Once a task is learned, Anthony may be able to continue adequate work perform-

ance without further demonstration. However, if interrupted or asked to perform a different task, a reorientation to the previous task, including demonstration, is often required. The workshop supervisor should never assume that Anthony has completely "mastered" a task. Close supervision is indicated at all times. He can read safety signs or simple operating instructions, but more often requires further detailed explanation of their meanings. He may be able to learn to use gross measurement devices, such as yardsticks and rules. He rarely, however, can make precise measurements. Anthony can learn to count basic numbers from one to ten, distinguish coins, and make simple change. He may also be expected to print his name and recognize most letters of the alphabet. He has difficulty telling time, but can learn the basic workday schedule.

Sensory (BVMGT and HVDT)

Anthony's sensory skills are also representative of sheltered workshop clients. While neuropsychological dysfunction is reflected in his performance, the disability is of limited extent, and should not prevent Anthony from participating in productive work activities. Anthony's median sensory T-score of 54 is associated with the lower extended level of vocational competency. Numerous contract activities may be performed by Anthony. However, most often these activities must first be simplified by task analysis techniques. This simplification process allows the individual with moderate sensory dysfunctions to accomplish "units" of each task without having to perceptually integrate the entire pattern or "gestalt." Although discrimination among fine textures is beyond Anthony's ability, he can discriminate size and shape. For example, different size nails are easily discriminated, if a reference size is available. Anthony can visually integrate motor activities and respond appropriately. He can use a hammer, saw, and other basic hand tools, but perceptual guides are necessary. Anthony can nail boards together correctly if a straight pencil guideline has been provided. Problems in sensory integration are indicated by Anthony's inability to join or correctly position the geometric figures on the BVMGT. It is doubtful he will be able to properly assemble picture frames requiring precise corner joining, or other assemblies involving perceptual integration.

Motor (MAND)

Anthony has relatively higher fine motor skills when compared with most extended level sheltered employees. The particularly high point in Anthony's profile is his fine motor skills, suggesting that he would perform adequately on most of the work contracts found in sheltered workshops. Anthony's total motor T-score of 57 suggests mild motor deficits as compared to the nonhandicapped population.

Individuals with similar scores perform within the upper extended range of vocational competency. Some improvement of motor ability may be observed with experience, but it is doubtful that Anthony will acquire the speed and dexterity necessary for advancement beyond the extended workshop environment. Anthony's motor skills are sufficiently developed to allow for safe operation of air powered and motor driven equipment. However, close supervision is recommended in both instances. Tasks requiring a 15 to 30 minute time period for completion may be learned by Anthony.

Motor tasks, such as beverage case repair, pallet manufacturing, doghouse construction, and planter box manufacturing, are well within his ability range. Muscle power and psychomotor speed of approximately seventy-five percent of normal can be expected. Balance, kinesthetic and perceptual motor integration skills are generally sufficient for safe operation of equipment such as radial-arm saws, handsaws, and drill presses, following sufficient training and under close supervision.

Emotional (OEI)

The OEI profile suggests that Anthony has moderate problems in emotional adjustment. The critical areas are in neuropsychological impulsivity and anxiety. Anthony may be expected to manifest some minor degree of inconsistency and distractability in his performance, and may seem preoccupied with concerns or problems at home. Excessive work stress should be avoided. A controlled routine work setting where the role expectations and directions are explicit and structured will help reduce his propensity to become confused and disorganized under stress of sudden change. Anthony's total OEI T-score of 45 suggests moderate emotional problems. The dynamics of these problems related to work include: a) irratic and inconsistent productivity; b) loss of motivation; c) lack of appropriate interpersonal communication skills; d) inappropriate behaviors such as excessive talking, interference with other workers, and fabrication. Sheltered workshop placement for Anthony will depend on the program and physical structure of the particular facility. Environmental manipulation in the work setting is extremely important in reducing problem behavior. Sound levels, lighting, size and work area, temperature, grouping, and the nature of work contracts are important elements of treatment in the sheltered milieu. Anthony will respond most effectively to a setting working by himself or in a small group. The environment should be devoid of visual and auditory distractions.

Integration-Coping (BRS)

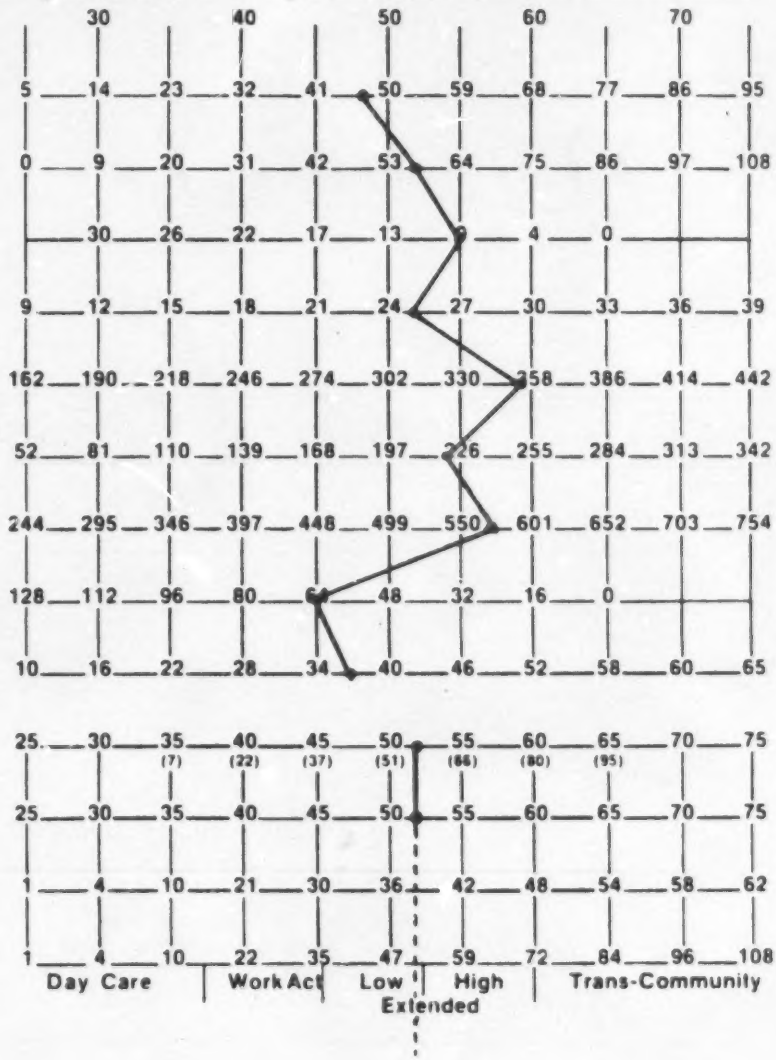
The integration and coping measures indicate that Anthony can be expected to function adequately in a sheltered workshop setting. He has the ability to learn the routine work tasks, and his performance after training will be consistent assuming a suitable work environment. His level of work potential will be restricted to a sheltered workshop setting, or a community work setting that provides a similar degree of structure. Anthony's total BRS T-score of 47 suggests moderate integration-coping deficits. He appears neatly and appropriately dressed approximately half the time, generally as influenced by the home environment. Anthony has minimally appropriate eating skills and table manners, but he must be frequently reminded of correct manners in social situations. He is able to use public conveyance under close supervision, when the selection of route or specific directions are given by the trainer, supervisor, or parent. Anthony could live independently if the mechanics of rent, utilities, and housekeeping were handled by a capable person. He has learned basic time concepts to the half hour, and can recognize and name five colors. He can count to twelve. He rarely facilitates the work performance of others, and is somewhat inconsistent in his communication with peers. Anthony's physical stamina will generally permit the handling of routine packaging, crating, and lifting of moderate weights. He can work on jobs requiring standing for several hours. He frequently abuses coffee

## McCARRON-DIAL WORK EVALUATION SYSTEM

INDIVIDUAL PROFILE

Name A. MITCHUM Age 26 Sex M Program EXTENDED

| | Raw Scores | T - Scores |
|---|---|---|
| **VERBAL-COGNITIVE** | | |
| WAIS-S-B IQ | 46 | 48 |
| PPVT IQ | 55 | 52 |
| **SENSORY** | | |
| BVMGT | 9 | 55 |
| HVDT | 25 | 52 |
| **MOTOR** | | |
| FINE | 350 | 59 |
| GROSS | 220 | 54 |
| TOTAL | 570 | 57 |
| **EMOTIONAL** | | |
| OEI | 64 | 45 |
| **INTEGRATION-COPING** | | |
| BRS | 37 | 47 |
| **WORK COMPETENCY** | | |
| SFVCS (T-Score) (Percentile) | | 52 |
| FTA (T-Score) | | 52 |
| % Minimum Wage (Current After Learning) | | 38% |
| % Minimum Wage (Predicted-After 1 yr. Exp.) | | 50% |




McCarron-Dial Systems, Inc. 1977

and rest break privileges and has to be remonded to return to work. Under production stress, he shows no significant change in productivity, and generally cannot increase performance proportionately with demands.

Predicted Performance and Productivity (FTA and SFVCS)

The FTA and SFVCS scores reflect highly consistent and prognostic work performance of the individual who has acclimated to a sheltered workshop program. Anthony's median T-score for work competency is 52. His scores are very similar to individuals functioning within the lower extended sheltered workshop range. Emphasis in interpreting the aforementioned predictor factors was determined by the following hierarchy of weighting: 1) integration-coping, (highest priority factor) 2) sensorymotor and emotional, (equal in significance) and 3) verbal, (third in priority) hierarchy was determined by the "Developmental Prerequisites to Vocational Competency Theory."

Summary and Recommendations

The diagnostic profile (upper) reveals that Anthony is presently functioning in the moderate range of mental retardation (PPVT, WAIS). Results on the BVMGT indicate pervasive cerebral dysfunction. Visual and haptic discriminations are, however, slightly above the mean for adult retardates. Anthony demonstrates a relative strength in fine motor ability and has a gross motor ability comparable to the average adult retardate in sheltered work programs. The results of OEI suggest Anthony has moderate problems in emotional adjustment.

The predictive profil (lower) illustrates a performance and productivity level within range for the lower extended sheltered workshop. The predictions were confirmed by actual performance on work samples in the sheltered workshop. On the basis of the aforementioned results, the case history, and observed behavior during testing, it is recommended that Anthony be placed initially in a lower extended sheltered workshop program. Vocational prognosis for Anthony is limited to terminal sheltered employment.

* INSERT INDIVIDUAL PROFILE ON A. MITCHUM ABOUT HERE *

In addition to the information included in the sample vocational evaluation report, the evaluator will generally include pertinent family, social, and medical data. In the comprehensive vocational evaluation, the evaluator is encouraged to integrate other information into the report including clinical interpretations or impressions, medical data, counselors' and supervisors' impressions, observations from work samples, and any other pertinent information which may contribute to a full understanding of the client. The completed evaluation may serve as the basis for preparation of an individual adjustment or rehabilitation plan.

Utilization of the Work Evaluation System by Rehabilitation Professionals

Various disciplines in the field of rehabilitation may benefit from information provided by the MDWES. In the initial phases of the rehabilitation process, the rehabilitation counselor will find the system an

objective and reliable method for suggesting the most appropriate intervention strategy. The rehabilitation counselor's utilization of the McCarron-Dial Work Evaluation System may vary according to the counselor's particular caseload, employment setting, or his role in an individual client's case. Field counselors in rehabilitation agencies may find the MDWES most effective in helping to determine the appropriate rehabilitation strategy for clients with disabilities affecting the central nervous system as illustrated by the case study by Anthony Mitchum. Counselors with mental retardation and mental health case loads will find the system particularly helpful in decision making concerning training and placement. The vocational programming levels described by the MDWES may suggest the most suitable work training and work adjustment settings for the client. The rehabilitation counselor's utilization of the MDWES may also be appropriate when considering criteria of eligibility for services. MDWES information can often help to suggest the interactive or counseling approach that may be most appropriate for a given case. The client's verbal-cognitive skills, abstract thinking ability, and capacity for gaining insight may be assessed by the system. From this assessment the counselor may determine his counseling or treatment strategy.

Direct service staff in rehabilitation facilities have used the MDWES most effectively in individual client programming. The system provides data which assists the direct service staff to specify rehabilitation goals and objectives. Specific strengths or deficits in verbal-cognitive, sensory, motor, emotional, and integration-coping skills can be identified by the system. Items on the Behavioral Rating Scale (integration-coping factor) and Observational Emotional Inventory (emotional factor) are often directly translated as target behaviors in behavior programming. Furthermore, the relative strengths and deficits in sensory-motor and verbal-cognitive performance often suggest to the direct service staff (including the vocational adjustment counselor) which combination of training approaches may be expected to yield positive results in attaining stated objectives.

Program coordinators and administrative staff have used the MDWES to evaluate the effectiveness of rehabilitation programs by comparing the pre-post program effects as reflected in the MDWES test results. Such comparisons often help identify whether a program is benefitting a particular client, or group of clients. Such measures are generally compared after a one year period of rehabilitation programming, although shorter intervals may also be appropriate. Program decisions may be more objectively made when success criteria are specifically related to measurable changes in individual and group abilities. The MDWES has an advantage in program evaluation since the system's data can be useful in suggesting: 1) alternative individual client programming; 2) the nature of staff development and training which may be needed; and 3) the nature of specific program consultation which may be helpful.

## Professional Qualifications

The professional most suited to administer and interpret the McCarron-Dial System for vocational evaluation purposes would ideally have the following qualifications: 1) specific certified training in the use of the system; 2) at least one or two years' experience in rehabilitation or psychosocial service; and 3) a bachelor's or master's

degree in behavioral or rehabilitation science. The instruments of the system appear deceptively simple to use but are actually quite sophisticated and require study and training to properly administer, score, and interpret.

## Clinical Neuropsychological Evaluation

The McCarron-Dial System is often used in concert with other neuropsychological instrumentation for clinical diagnosis of the patient's specific brain-behavior conditions. In the clinical context, the procedures are referred to as "the McCarron-Dial Evaluation System (MDES)," without specific reference to "work" criteria. Although the instrumentation remains essentially the same in clinical assessment, the interpretation procedures differ considerably, as does the specific focus or purpose of the evaluation. The focus of the clinical applications of the MDES is three-fold: 1) the diagnosis of organic brain syndrome and the locus of a specific lesion; 2) the determination of whether the condition is chronic or acute and static or progressive; and 3) the evaluation of the effects of brain dysfunctions on learning and adaptive behavior. The instruments included in the MDES are specifically designed to assess particular brain-behavior relationships. The primary structural and functional brain correlates to the MDES test performance are located in the cerebral cortex. A basic structural organization of the cerebral cortex is presented in Figure IV.

* INSERT FIGURE IV ABOUT HERE *

Ther cerebral cortex can be conceptualized as consisting of morphologically distinct areas or lobes. The predominant areas include: the frontal lobes; the parietal lobes; the occipital lobes; and the temporal lobes. While the brain generally operates as a unit, each of these lobes is considered to be primarily responsible for specific types of processing, analyzing, initiating, or coordinating complex forms of behavior. For example, the parietal area is generally responsible for processing and integrating sensory data. The Haptic Visual Discrimination Test would be particularly sensitive to a lesion in the parietal lobe. Other MDES instruments are sensitive to lesions in different areas of the cortex.

## The Clinical Evaluation Process - Phase I

The MDES is used most often for clinical assessment in concert with a comprehensive medical neurological examination and the traditional clinical psychological evaluation. Most conditions involving the higher cortical centers of the central nervous system may be evaluated with the MDES. Furthermore, children as well as adults may be evaluated. The method of procedure begins with a general clinical interview to obtain the patient's general history including: 1) medical history; 2) emotional social, and interpersonal functioning: 3) educational history; 4) vocational history as appropriate; 5) family structure and dynamics; and 6) personal and vocational interests. The interview is typically conducted by the clinical psychologist or rehabilitation counselor. Other professionals may be involved in securing this information. The central purpose of the evaluation is to determine the presence or absence of higher cortical brain dysfunction and, if present, to suggest the appropriate strategies for vocational rehabilitation, treatment, training, or education.

Clinical Evaluation - Phase II

The second phase of the clinical neuropsychological evaluation usually involves the administration of the standard psychological tests of intelligence, academic achievement, and organicity. The Wechsler Scales are the preferred individual tests of intelligence when conducting the clinical neuropsychological examination. The WAIS (or WISC-R) (Wechsler, 1955, 1976) provides verbal and performance measures which can be used as indices of cerebral functioning. When used in neuropsychological assessment, the WAIS/WISC-R subtests are rich in information concerning the differential functioning of the cerebral hemispheres and often provide specific pathognomonic signs and basic data useful in determining the influence of educational or cultural background (Reitan and Davison, 1974; Lezak, 1976). In addition to the WAIS, the clinical psychologist will usually administer the Bender Visual Motor Gestalt Test (BVMGT). The BVMGT is used in the MDES as primarily a measure of general cerebral functioning; however, it may be most depressed by either damage to the motor system or lesions in the right-hemisphere parieto-occipital lobes. Performance on the Bender may be influenced somewhat, by other variables. In general, no single measure is used in clinical neuropsychology to describe specific anatomical lesions. When the BVMGT is used with the MDES, the Koppitz (1964, 1975) scoring protocol is used. Adult BVMGT norms for neurologically impaired patients are provided by the MDES. The Wide Range Achievement Test (Jastak, et.al., 1965) or the Peabody Individual Achievement Test (Dunn and Markwardt, 1970) is then administered by the clinical psychologist to determine the patient's level of academic achievement. At this point, specific learning disabilities may be inferred from data by the clinician. Generally, a two grade level differential between tested academic achievement and expected achievement derived from verbal I.Q. is operational-16 deficit as a "learning disability by the MDS (Henke, 1976).*

Based upon patient interview information and test results obtained in the clinical psychological evaluation, a decision is made as to whether the patient should be referred to the comprehensive neurological examination before the formal clinical neuropsychological examination is conducted. The following are examples of reported behavior which suggest that the comprehensive neurological examination should be conducted first: 1) the patient reports headaches, blurry vision, dizziness, weakness to one side of the body, and sudden onset of these symptoms; 2) the patient reports some of the aforementioned acute symptoms, but has had no special medical evaluation; 3) the patient reports reoccuring seizures and has had no recent medical specialist evaluation; 4) the patient is taking anticonvulsant or psychotomimetic drugs without benefit of recent medical evaluation; 5) the patient reports the above symptoms following a specific illness (usually accompanied by high fevers or head trauma); or 6) the patient reports symptoms followed by or concomitant with depression, spatial disorientation, or sudden loss of language capacity. If none of the aforementioned (or other similar) conditions were observed in the preliminary testing, the patient is administered the MDES instruments by the clinical neuropsychologist.

Formal Neuropsychological Testing - Phase III

The formal neuropsychological testing begins with the administration of the Haptic Visual Discrimination Test (HVDT) to the right and then the left hand. Performance on the HVDT suggests the relative integrity and

*see Addendum I

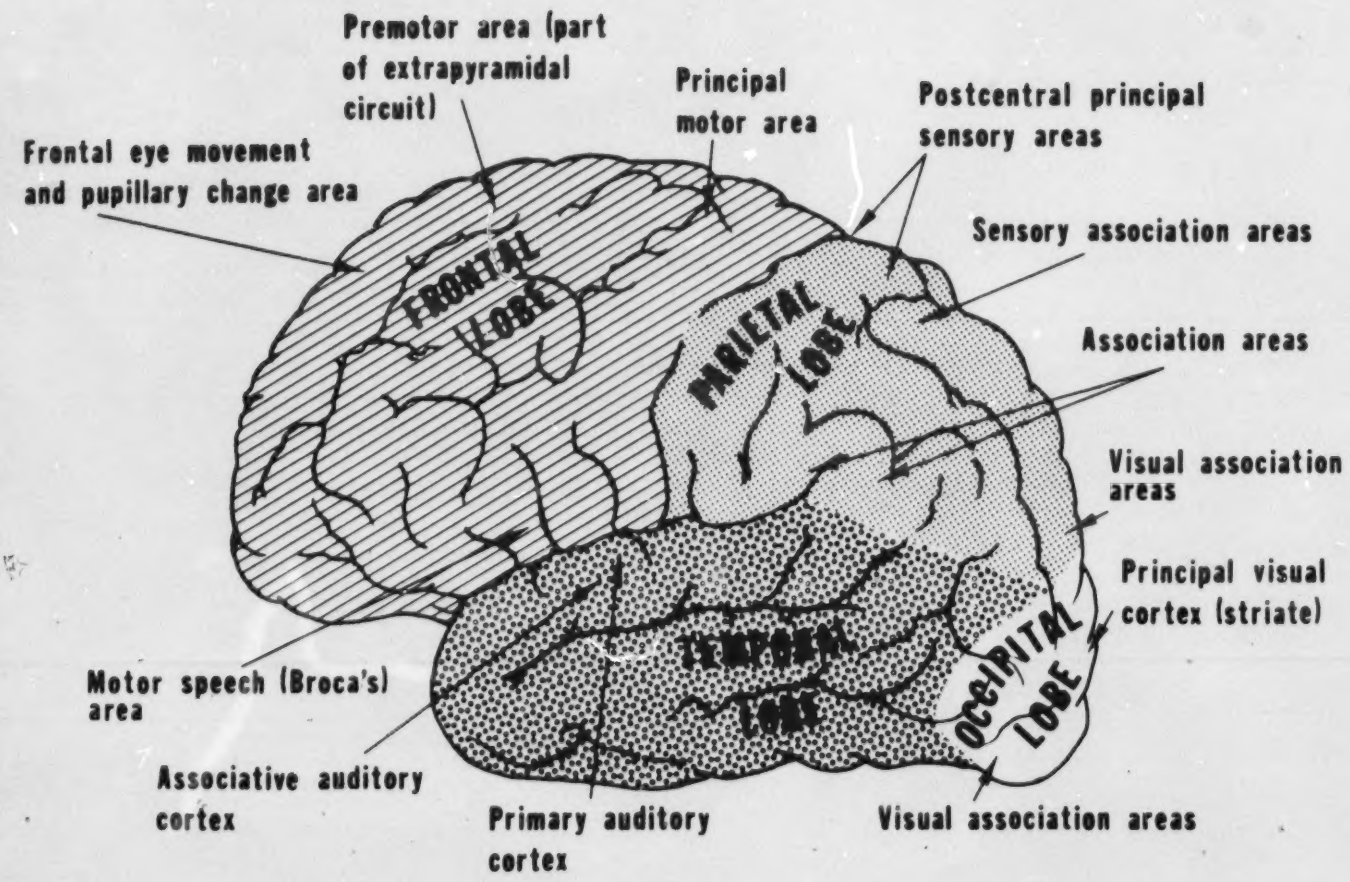



FIGURE IV. Lateral view of left cerebral hemisphere.

dynamic functioning of the parietal lobe (damage in the frontal or temporal lobes may also produce a lower score, but not as dramatically as a parietal lesion). Performance on the HVDT may also be affected by peripheral nerve loss, cerebral palsy, and other physical conditions. Since sensory functions do not show a particular dominance factor associated with handedness, the right hand presentation score should approximate the score obtained on the left hand presentation. Also the total HVDT scores for either presentation should be expected to reach a "performance level" in the normal range.

Next, the McCarron Assessment of Neuromuscular Development (MAND) is administered in the usual fashion, but the primary emphasis in interpretation is based on: 1) pattern analysis and performance on the four factors - persistent control, muscle power kinesthetic integration, and bimanual dexterity; 2) the hand preference index which provides a measure of the extent to which motor coordination and power is in proper correlation with handedness, and 3) the total Neuromuscular Developmental Index. The total Neuromuscular Developmental Index (NDI) provides a level of performance score which may alert the clinician to possible cerebral dysfunction; dysfunction involving the cerebellum or basal ganglia. Obviously, motor performance may also be affected by cord injuries, skeletal-muscular trauma, or disease; as well as peripheral nerve losses. However, these conditions should be most obvious to the trained clinician and therefore would be accounted for in an interpretation of Central Nervous System dysfunctions. In addition to the HVDT and MAND, other instruments such as the Halstead Categories Test and Reitan Wepman Asphasic/Apraxic Screening may be incorporated into the formal clinical neuropsychological evaluation.

Informal techniques may also be incorporated into the clinical neuropsychological examination. Such techniques include: observation for visual tracking, and visual field defects, auditory and visual acuity, and some basic reflexes. The patient is also observed for gait, general coordination, physical symmetry, and gross physical condition. The entire clinical neuropsychological procedure follows specific inferential guides to diagnosis. Reitan (1962) has outlined a guideline for inferring brain damage in adults and children which serves as a good model in interpreting the MDES results in clinical neuropsychological evaluation. The model points to four basic categories of data inference: 1) level of performance (such as full-scale IQ on the WAIS, total N.D.I., etc.; 2) the occurrence of specific deficits (such as grossly enlarged BVMGT reproductions, 3) patterns and relationships among the patient's test scores (such as significantly lower performance IQ than verbal IQ), and 4) differences in the adequacy of motor and sensory-perceptual functions on the two sides of the body as measured by specific neuropsychological instruments such as the Haptic Visual Discrimination Test or McCarron Assessment of Neuromuscular Development.

The report that is transmitted to the rehabilitation counselor contains the integrated interpretation of all pertinent brain-behavior information. The McCarron-Dial System includes a report structure which helps the clinician translate his findings into meaningful and practical recommendations for rehabilitation programming. The following sample report illustrates the use of the McCarron-Dial Evaluation System in clinical neuropsychological evaluation:

## NEUROPSYCHOLOGICAL EVALUATION

| | | |
|---|---|---|
| NAME: | Phillip Smith* | AGE: 17 - 7 |
| DATE OF BIRTH: | September 3, 1959 | SEX: Male |
| DATE OF EVALUATION: | April 7, 1977 | |

REFERRAL SOURCE: Rehabilitation Commission
Tim Sessions - Counselor

Mr. Smith was administered the following battery of neuropsychological instruments to determine possible neuropsychological diability; (his potential to benefit from training in expressed vocational interest areas); and to determine recommendations for possible rehabilitation strategies:

Wechsler Adult Intelligence Scales (WAIS)
Peabody Picture Vocabulary Test (PPVT)
Wide Range Achievement Test (WRAT)
Bender Visual Motor Gestalt Test (BVMGT)
standard and memory presentations
Haptic-Visual Discrimination Test (HVDT)
McCarron Assessment of Neuromuscular Development (MAND)
Reitan-Wepman Aphasic/Apraxic Screening (RWAS)
Diagnostic Interview

### VERBAL-COGNITIVE

The results of the diagnostic interview, and verbal I.Q. screening, as well as intelligence and academic achievement testing provided by previous psychological assessment, served as the basis for describing Phillip's verbal-cognitive skills. Phillip's full scale I.Q. on the WAIS (administered 3-22-77 by Dr. Swain) would indicate "borderline mental retardation". Both verbal and performance scales were consistent with the full scale I.Q. (verbal = 78; performance = 75). Subtest scatter most sensitive to educational factors (information, arithmetic, and vocabulary) would tend to indicate that Phillip has benefited from educational experiences in a manner consistent with his general intellectual functioning. The attained academic achievement levels, however, (WRAT Reading = 4.0 grade level; Spelling = 2.5 grade level: and Arithmetic = 3.2 grade level) are below that expected for his chronological age and educational experiences. Subtests which reflect Phillip's abilities to integrate visual detail; form cognitive relationships, and form abstract concepts (similarities, picture completion, and picture arrangement) are relatively higher than measures of academic verbal learning; Phillip would appear to have a slightly greater capacity to make cognitive adaptations to work and daily living requirements than would be reflected in his full scale I.Q. He probably is capable to functioning in a general sense similar to borderline low normal levels. Social adaptation is however, a questionable facet of Phillip's profile. He would tend to have initial difficulties in a living and work environment which required different "survival skills" than what he has gained from his past experiences. Placement considerations should include attempts to avoid situations which would require rapid or immediate adaptations.

* Name is fictitious.

Phillip's "real difficulties" are evidenced by looking at his performance on the WAIS neuropsychological scales refractory to generalized cerebral dysfunction: digit span, digit symbol, and block design. If an "I.Q." were prorated on the basis of performance on these subtests alone, Phillip would score "33". His general level of verbal-cognitive functioning obviously exceeds this, but the aforementioned deficits on the neuropsychological scales have pronounced implications in terms of potential learning and task acquisition levels, as well as rates of learning to be expected.

Although it was obvious that Phillip has some disadvantage in expressive language, his ability to follow verbal commands in a work situation might be more directly inferred from a measure of receptive skill. The PPVT was administered as a measure of verbal receptive language and resulted in an "i.Q." of 78. Receptive vocabulary would appear better than expressed skills as might be expected. Phillip will be able to understand and follow most verbal commands necessary for adequate work performance in semi-skilled and some skilled job situations. He may, however, have some problems explaining in detail difficulties experienced in a particular task procedure.

SENSORY

Phillip's reproduction of the BVMGT designs in the usual test procedure revealed four (4) scorable errors using the Koppitz scoring system. Angular distortions and problems in integration were most prevelent. Six of the nine designs were recalled when Phillip was asked to draw them from memory; only four were correctly localized.

Some deficits in fine visual-motor coordination were evidenced in Phillip's performance, but the primary difficulty appeared to be in spatial memory. This is important considering his experssed vocational interest in welding. Problems in spatial memory may preclude less than adequate performance in higher level welding jobs. Phillip would, however, appear to have the necessary sensory skills to function in a welder helper's role, or in a primary welding function if it is simple "fail safe" and done in set forms.

Phillip was administered the HVDT to both right and left hands. His performance in both instances was two standard deviations below the mean.

lateralized sensory dysfunction was noted. Generalized sensory impairment in both cerebral hemispheres is indicated. Phillip's tactile and kinesthetic sensory learning modalities are significantly impaired when comparing his performance to the normal population. This test is considered a culturally free assessment of bimodal haptic-visual sensory integration. The HVDT results are highly correlated in learning disabilities in reading, match, and spelling. The HVDT is also correlated to problems in language expression, language utilization, processing of auditory information, attending, general adequacy of work performance, and other work related skills. Phillip's performance on the HVDT is similar to an individual in a transitional sheltered workshop. Although he has sensory deficits, he will be able to acquire the necessary skills to perform semi-skilled work. The primary problem will be the extended amount of time he will require to learn adequate skills.

MOTOR SKILLS

Phillip's total Neuromuscular Developmental Index of 61 (mean = 100; standard deviation = 30) is significantly below that expected for his physical stature and chronological age.

The overall lowered motor performance would suggest possible generalized dysfunction of the cerebral cortex. Phillip's bimanual dexterity score of 60 (M - 100; sd - 30) suggests possible lateralized dysfunctions of a specific nature in addition to an overall general depression of C.N.S. function. Balance and kinesthetic integration scores (40) are significantly below other motor scales and suggest even more specific losses related to the vestibular system. Balance functions on the left leg with eyes closed are extremely impaired. Motor inhibittion scores (75) on the other hand, would suggest that Phillip has compensated well for losses in coordination and balance. He appears to reduce the rate of motor performance to adjust for difficulties experienced in precise fine motor movement as well as difficulties imposed in balance. Muscle power is within normal limits for an adult male. Both hand and leg strength is quite adequate for normal physical work requirements. Significantly better gross than fine motor performance was observed.

Three of the four clinical indicators imply a more serious dysfunction lateralized to the left motor functions in addition to mild bilateral losses in coordination. Such a profile, combined with general haptic sensory losses, and poor performance on the WAIS block design, digit symbol, and digit span subtests may suggest a lateralized left motor dysfunction, incoordinated finger and arm movements, with lateralize slight deficits in fine motor inhibition. More specific sensory and motor dysfunction to the right cerebral hemisphere is noted in general performance, but specific losses in motor inhibition, and expressive language processing are evident in the left hemisphere language function.

APHASIC AND APRAXIC SCREENING

The Reitan-Wepman Aphasic/Apraxic Screening Test revealed language-symbol deficits associated with conjectured left hemisphere dysfunction and expressive spatial difficulties in copying the Reitan cross, triangle, square and key. These findings tend to confirm speculation of brain-behavior deficits associated with a generalized dysfunction of both the right and left cerebral hemispheres

SUMMARY AND RECOMMENDATIONS

Generalized mild brain dysfunction impairing the appreciation of both verbal/serial and spatial aspects of the environment. Compound disabilities attributable to cerebral dysfunction, and limited appropriate academic experiences. Somewhat better skills in abstract reasoning than reflected by his full scale I.Q. of 75 were observed. Phillip has better gross than fine motor skills, but both are below expected performance levels for his age and physical stature. Sequential integration (step by step) presentation of stimuli in the training setting may facilitate learning better than simultaneous presentation (pictorial representations) of material. Tactile-visual processing is poor. Adequate skills in

verbal direction following were observed. Adequacy of work performance will depend on pressure for productivity, and inverse relationship will be observed for Phillip. In comparison to the norms for neuropsychological disability, Phillip would appear to have better motor expressive skills than verbal-cognitive skills. Phillip has expressive levels without the necessary cognitive ability to reflect on his behavior; he may therefore be expected to have a tendency toward inappropriate acting-out behavior under stress. Environmental structuring will be necessary. His sensory integration deficits may predispose distortions in perception of the environmental situations. Structure, consistency, and successive approximation of the rehabilitation objectives will be important.

RECOMMENDATIONS

1. Considerations may be made of a modified vocationa objective in keeping with Phillip's expressed interest in welding. Training for jobs involving some specific, but less complicated, aspects of welding may be appropriate; i.e., automobile muffler repair shop helper; farm implement repair and service helper; construction helper in pipefitting (training time will most likely have to be extended beyond normal lengths in this case).

2. On the job training as opposed to a "formal classroom skill training" should be emphasized. A kind, but firm O.J.T. supervisor who is sensitive to Phillip's needs is recommended.

3. Possible career exploration and development related to jobs similar to his expressed interest.

* INSERT P. SMITH'S PROFILE HERE *

Utilization of the Clinical Evaluation System by Rehabilitation Professionals

In addition to the systems application for work evaluation, the procedures are also being used for clinical diagnosis. Counselors are often faced with difficult decisions regarding the feasibility or appropriateness of rehabilitation for cases of brain dysfunction. Psychological and neurological consultations provide useful information for decision making, but are alone often unable to identify the specific brain behavior relationships which may describe the patient's primary disabilities.

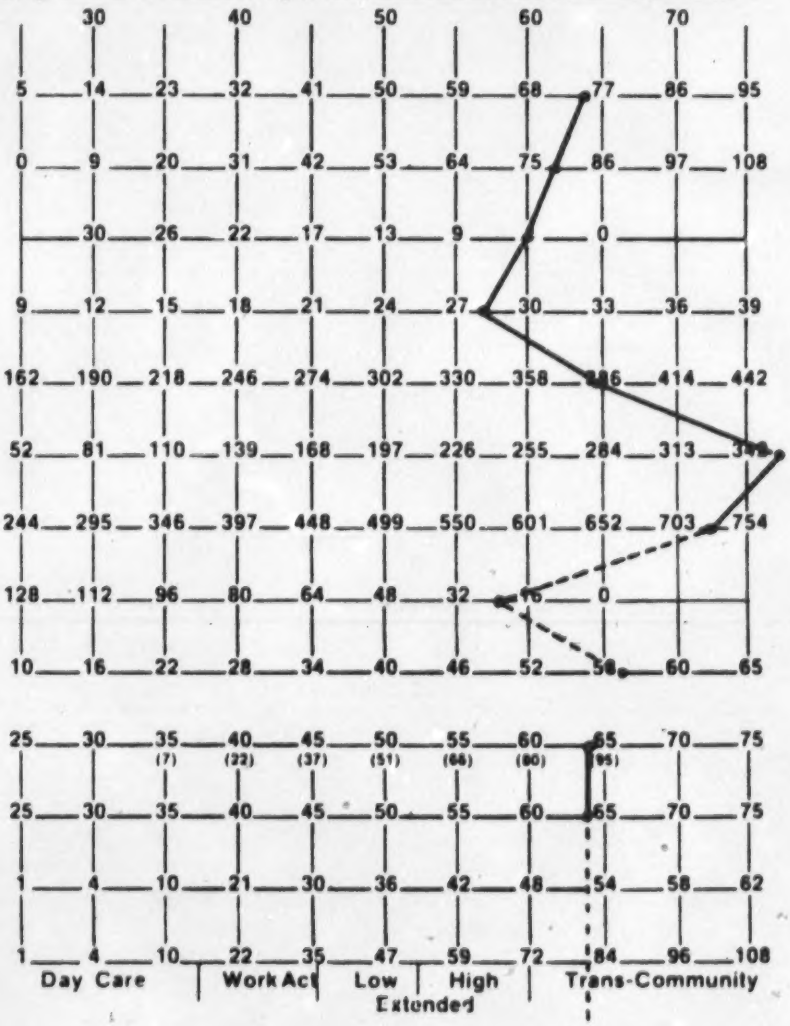
The clinical neuropsychological evaluation is considered an important and integrated part of the diagnostic and treatment phase when there is any suggestions of possible involvement of higher cortical centers. The MDES is a valuable neuropsychological tool in assisting the counselor to develop effective strategies of rehabilitation. The clinical neuropsychological evaluation may be most effectively utilized in the rehabilitation process as a special evaluation in cases where traditional clinical evaluation reports suggest possible brain dysfunction, or in cases where major differences in diagnostic conclusions are reported by medical and psychological examiners. The clinical neuropsychological evaluation may also be appropriate for monitoring the patient's progress in a rehabilitation program.

## McCARRON-DIAL WORK EVALUATION SYSTEM

INDIVIDUAL PROFILE

Name Phillip Age 17-7 Sex M Program TRANS- COMMUNITY

| | Raw Scores | | T - Scores |
|---|---|---|---|
| **VERBAL-COGNITIVE** | | | |
| WAIS-S-B IQ | 75 | | 64 |
| PPVT IQ | 78 | | 62 |
| **SENSORY** | | | |
| BVMGT | 4 | | 60 |
| HVDT | 28 | | 57 |
| **MOTOR** | | | |
| FINE | 384 | | 65 |
| GROSS | 355 | | 78 |
| TOTAL | 739 | | 73 |
| **EMOTIONAL** | | | |
| OEI | 23 | EST. | 58 |
| **INTEGRATION-COPING** | | | |
| BRS | 59 | EST. | 66 |
| **WORK COMPETENCY** | | | |
| SFVCS (T-Score) (Percentile) | | | 64 |
| FTA (T-Score) | | | 64 |
| % Minimum Wage (Current After Learning) | | | 53% |
| % Minimum Wage (Predicted-After 1 yr. Exp.) | | | 81% |




McCarron-Dial Systems, Inc. 1977

The MDES results can facilitate counselor judgement regarding the interactive or counseling approaches to employ in a given case. If the patient/client has adequate-to-good left-hemisphere functioning, more cognitive or rational approaches to counseling may be effective. The counselor would tend to spend more time explaining the reasons or rationale to the client for rehabilitation strategies. Also the counselor would elicit more verbal-cognitive input from the patient/client in formulating the rehabilitation plan. When the patient/client has less verbal-cognitive strengths, the counselor would be more concrete in the verbal interchange. In general, the interactive counseling style should meet the patient's C.N.S. strengths.

Professional Qualifications

The professional qualifications for using the McCarron-Dial Evaluation System in clinical neuropsychological diagnosis should include: 1) a Medical Doctorate, Doctorate in Philosophy, or Educational Doctorate with additional training in clinical neuropsychology, 2) specific training in the administration, scoring, and interpretation of the MDES . A masters level clinician or school psychologist would be suitably qualified to use the MDES under the supervision of the doctorate level psychologist. State licensure boards may impose additional qualifications in some states.

Future Developments of the McCarron-Dial System

The McCarron-Dial System (MDS) is the product of a comprehensive research program which began in 1970. Initially, the authors were the principal investigators; however, in recent years, other investigators and field service personnel have contributed to the neuropsychological research related to the system's development. As a result of increased research interests, numerous MDS projects are currently in progress. The major MDS research and development projects in progress can be categorized as follows: 1) new and expanded literature on the present system; 2) new and additional tests to measure the sensory and integration-coping factors; 3) new tests to measure additional neuropsychological factors; 4) adaptation of existing instrumentation for other disabilities; 5) comparisons of the traditional expanded neurological soft sign clinical diagnostic procedures to the MDS in the diagnosis of language learning disabilities; 6) Neuropsychological profile analysis of children on Mellaril, Ritalin, and non-medication treatments for the control of hyperactivity; 7) interactive computer consultation programs.

The new and expanded literature on the MDS includes three major works in progress. The first and most important additional contribution is the forthcoming text entitled, "Sensory Integration, the Haptic-Visual Processes." This text is a 400-page volume which will serve various purposes in rehabilitation and behavioral sciences. The sensory integration text will be a compilation of research related to haptic-visual processing and its quantifiable measurement. The importance of assessing sensory integration is illustrated by numerous citations of research that show the role of haptic-visual integration processed in evaluating higher cortical functioning in man. The text will also serve as a "comprehensive manual" for work evaluators and clinicians using the McCarron-Dial System. A complete review of administration and interpretation procedures for the Haptic Visual Discrimination Test is provided in the text. Some sixteen case studies involving the assessment of the

haptic-visual processes are included. Furthermore, developmental as well as disability norms are available in the new publication. The forthcoming text also discusses the Haptic Memory Matching Test (HMMT) and its use in evaluation of the visually impaired/blind.

The primary additional instruments to measure existing factors under current development include: 1) the "Streets Survival Skills Questionnaire" (SSSQ) by Dr. Dan Linkenhoker and Dr. L. T. McCarron; 2) "Auditory Processing Test" by L. T. McCarron and J. Dial; and 3) The "Concept Learning Test" (CLT) by J. Dial and Dr. L. T. McCarron. The Streets Survival Skills Questionnaire (SSSQ) is designed as an additional instrument to measure the MDWES integration-coping factor. The SSSQ is a comprehensive psychometric measurement instrument of adaptive behavior that can be administered in a standard testing situation. The instrument will require approximately one hour of testing time; it can be administered to all MDWES vocational competency levels; and the results can be directly translated to adjustment programming. The SSSQ will be available for field research by Summer of 1978.

The Auditory Processing Test (APT) will be a measure of sensory and cognitive factors. In vocational and educational evaluation, the APT will provide additional information to predict specific work behaviors, and to suggest the appropriate mode of presenting learning material to the client. The clinical assessment, The APT will assess the functional integrity of the temporal lobes of the cerebral cortex, as well as intermediary neural structures, and transduction systems of the auditory sensory system.

The Concepts Learning Test (C.L.T.) is a measure of a person'a learning ability related to the acquisition of new concepts. The test is similar in nature to the Halstead Categories Test, but requires no special apparatus, and will provide developmental and disability norms. In vocational and educational evaluation, the CLT will serve as a measure of the individual's ability to acquire new information, categorize data, conceptualize or generalize the application of knowledge to new situations, and form abstractions. The test will help program staff to decide on the best method of presenting learning material and the specific content of material that may be expected to be learned by an individual. In clinical assessment, the C.L.T. will provide an objective measure of generalized cerebral dysfunction, and indicate possible lateralization of a cerebral lesion. The Concepts Learning Test provides a measure of overall integration of abilities, and may therefore, be considered a separate learning abilities factor.

Other assessments of factors not previously evaluated by the McCarron-Dial System will include: 1) tests of immediate, short term, and remote memory; 2) vocational interests; and 3) environmental support factors in the institutional and community environments. The assessment instruments are in the planning stages for future research and development.

The McCarron-Dial System is currently being adapted for use with a wide variety of disabling conditions not previously included in the vocational or clinical procedures. The most extensive work to date has been directed toward the adaptation of the HVDT and the MAND to use with the visually-impaired, blind, and deaf/hearing-impaired populations. The

Haptic Test has been modified to measure the Haptic-memory processes; initial data for 80 visually-impaired, mentally retarded individuals has been gathered by personnel of Texas State Commission for the Blind. The Commission for the Blind has also gathered data on the modified MAND and OEI. These modified instruments and norms for the blind will be available for general use within the next two years. Over 150 deaf/hearing impaired individuals have been evaluated with the HVDT; MAND; WAIS performance scales, BVMGT, WRAT, PIAT, and subtests of the I.T.P.A. Data from these studies will also be available to System users within the next two years. Other disability studies with the MDWES are being undertaken by investigators throughout the United States, canada, Puerto Rico, and Nigeria. In addition, the MAND and HVDT are being renormed on Latin American samples being gathered in Santiago, Chile, S.A. by Mary Hart de Lowry, M.D.

One of the most comprehensive MDS research projects currently in progress is being conducted by J. Dial, L. T. McCarron, D. Mishelevich, K. Dana, A. Muecke, S. Mays, L. Peterson, D. Linkenhoker, and R. Henke. The project is directed toward the development of a computerized assessment and consultation system dubbed C.A.P. The primary research and development efforts are being conducted at the University of Texas Health Science Center at Dallas, including both the Department of Rehabilitation Science and the Medical Computer Resources Center. The project includes several stages of research and development of an automated, interactive computer program designed to provide interpretation of the M.D.S. data, diagnostic information, and possible intervention strategies for rehabilitation and treatment. The C.A.P. system will provide immediate consultation to evaluators and clinicians in the field through a network of interactive hard-copy computer terminals. The C.A.P. System will provide an excellent medium for case consultation and continuing education of evaluators and clinicians using the M.D.S. The first stages of the C.A.P. System are scheduled for field research within the next two years.

## Summary and Conclusion

The McCarron-Dial Evaluation System has been described as useful in both vocational and clinical evaluation. The common theoretical base for the system is best viewed from a neuropsychological perspective, which stresses the importance of the brain as the "organ of behavior." Although the brain and central nervous system are not viewed as isolated from the person as a whole, the neuropsychological perspective is considered the most appropriate and effective means of understanding man's behavior, particularly the complex behaviors involved in "work" and "interpersonal relations" which are so often the crux of successful rehabilitation. Evaluation is viewed as holistic and inclusive of all information which may lead to a better understanding of the individual and his rehabilitation needs. The McCarron-Dial System is not a "closed system"; all data, regardless of source, is viewed as potentially useful in the rehabilitation of the person. The McCarron-Dial System is designed simply as a theoretical and practical structure for understanding and organizing relevant data from the entire information pool which may be available.

## ADDENDUM I

EQUATION TO ESTIMATE EXPECTED ACHIEVEMENT:

$$\text{Expected achievement} = \frac{\text{Verbal IQ}}{100} \times \text{chronological age} - 6$$

Results expressed in grade level equivalents.

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